

# **CHARACTERIZATION OF PLANTS AND SOILS IN A *SPARTINA ALTERNIFLORA* SALT MARSH EXPERIENCING “BROWN MARSH” DIEBACK IN TERREBONNE PARISH, LOUISIANA, USA**

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Widespread vegetation dieback in Louisiana salt marshes was first observed in spring, 2000. The primary species affected by this phenomenon was *Spartina alterniflora* Loisel. We established two study sites: one in a stressed saltmarsh at the south end of Bay Junop in Terrebonne Parish, Louisiana, and a second in a healthy reference site nearby along Bayou du Large. At the Bay Junop site we identified five distinct zones based on color and physical appearance of the plants, ranging from green patches of living plants to brown and black patches of dead plants in various stages of degradation. Interstitial water chemistry data were collected at the Bay Junop (stressed) site in early June. We initiated detailed measurements of the plant community structure and soil physicochemical characteristics in August at the stressed site and in September at the reference site. We collected data biweekly through October, then monthly from November on. For both live and dead *S. alterniflora* stems we recorded counts and heights; for the live plants we also recorded the number of live and dead leaves and stress categories. We measured salinity, sulfides, pH, NH<sub>4</sub>, N+N, PO<sub>4</sub>, and Eh in interstitial waters at 15 cm (root zone) and 30 cm (below the root zone) soil depths, and in the surface waters for each plot, as well as in the bayou adjacent to each site.

Live plant heights at the end of the growing season differed significantly ( $P = 0.002$ ) between the stressed (mean = 28 (SE) 2.42 cm) and reference (mean = 42 (SE) 2.92 cm) sites. At the stressed site the mean number of stems and height of dead stems in early August were 28.25 (SE) 3.16 /m<sup>2</sup> and 21.00 (SE) 1.44 cm, respectively. Those values decreased over time largely due to weathering, snail herbivory, and decomposition so that by mid-November, the dead zones had become unvegetated mudflats (mean dead stem counts = 8.5 (SE) 1.93 /m<sup>2</sup>; mean dead stem height = 5.28 (SE) 1.41 cm). Interstitial sulfides, salinity, pH, and soil Eh were not significantly different by depth between sites. Salinity and sulfide levels were significantly different ( $P = 0.001$ ) among sampling dates at both 15 and 30 cm for both sites. Interstitial sulfides were generally less than 2 mM within the root zone and tended to be higher in the Bay Junop live zone and in the reference site than in the Bay Junop dead zones. Salinity ranged from approximately 18 to 30 g/L<sup>-1</sup> at all depths, well within tolerance limits for *S. alterniflora*, and pH was slightly basic. Soils were oxidized within the root zone of the reference site (mean Eh = 48 mV) but were reduced at the stressed site where mean redox was approximately -45mV in the root zone and as low as -100 mV below the root zone. We have seen no sign of recovery in the dead zones at Bay Junop. Sampling at both sites will continue through the winter and into the growing season of 2001 to document whether the affected site continues to degrade, becomes stable, or recovers.